MCS®
Series
Modular Component Systems

Stereo Receiver
Owner's Handbook

Modular Component Systems
3245 Stereo Receiver
MCS Series

Dear Audiophile

Your new MCS Series® receiver was engineered and assembled under exacting quality control standards to provide you with years of dependable, troublefree operation. Just a few minutes of your time spent reading this manual will assure optimum performance of your unit.

Please record your unit's model and serial numbers in the space provided below and retain this manual for future reference. If you have any questions or require technical assistance, please contact your nearest JCPenney store or catalog desk for prompt and courteous service.

WARNING...

TO PREVENT FIRE OR SHOCK HAZARD DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

In the space provided below record the model and serial numbers.

Model _______________ SN _______________

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Modular Component Systems
3245 Stereo Receiver
MCS Series
FM
88
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100
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MHz
Speakers
Off
A
B
A+B
Matrix
Left
Right
FM Stereo
Tuning
Volume
Balance
Power
Headphone
Bass
Midrange
Treble
Turnover
Tone Defeat
AM
FM
Phono I
Phono 2
Aux
Loudness
Subsonic
Scratch
Mode
FM Muting
Monitor
Tape
Duplicate

Preparation for Use

1. Introduction

Before leaving the factory, each MCS Series® receiver is subjected to a wide variety of quality checks and final adjustments. If damage has occured during shipping, please return your MCS Series® receiver with all packing material to your nearest JCPenney store for a prompt claim.

a. Carefully remove the receiver from the styrofoam packing material. Do not attempt to lift receiver by grasping AM antenna on rear panel.

b. Separate all accessories; place all packing material back in receiver box. The box and packing material should be retained in the event that reshipment is necessary.

2. Equipment Supplied

The following is a list of equipment and material supplied with the MCS Series® receiver:

a. FM dipole antenna

b. Owner's manual

c. Warranty Card

d. Two 10 Ft. lengths of twin conductor speaker wire

3. Introduction

A completely connected receiver rear panel is shown in Figure 1. A detailed description of the individual rear panel connections is contained in the remaining paragraphs of this section.

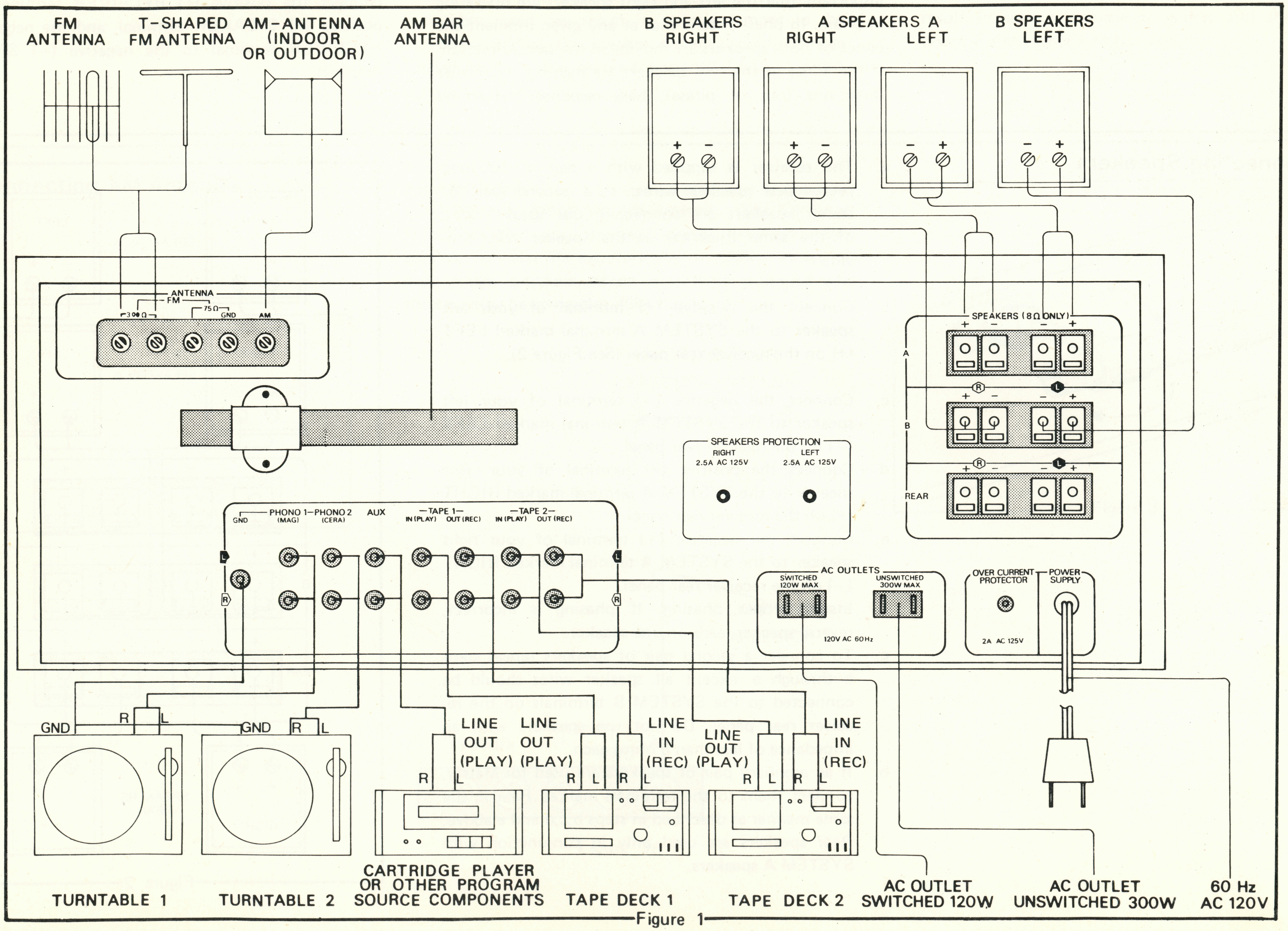

FM ANTENNA
T-SHAPED FM ANTENNA
AM-ANTENNA (INDOOR OR OUTDOOR)
AM BAR ANTENNA
B SPEAKERS RIGHT
A SPEAKERS RIGHT
A SPEAKERS LEFT
B SPEAKERS LEFT
ANTENNA
FM
300 Ω
75 Ω
GND
AM
SPEAKERS (8Ω ONLY)
A
B
REAR
R
L
+
−
SPEAKERS PROTECTION
RIGHT 2.5A AC 125V
LEFT 2.5A AC 125V
GND
PHONO 1 (MAG)
PHONO 2 (CERA)
AUX
TAPE 1 IN (PLAY) OUT (REC)
TAPE 2 IN (PLAY) OUT (REC)
AC OUTLETS
SWITCHED 120W MAX
UNSWITCHED 300W MAX
120V AC 60Hz
OVER CURRENT PROTECTOR
2A AC 125V
POWER SUPPLY
GND
R
L
LINE OUT (PLAY)
LINE OUT (PLAY)
LINE IN (REC)
LINE OUT (PLAY)
LINE IN (REC)
TURNTABLE 1
TURNTABLE 2
CARTRIDGE PLAYER OR OTHER PROGRAM SOURCE COMPONENTS
TAPE DECK 1
TAPE DECK 2
AC OUTLET SWITCHED 120W
AC OUTLET UNSWITCHED 300W
60 Hz AC 120V

Figure 1

Receiver Connections

4. Speaker Phasing

To obtain faithful reproduction of sound, it is very important that the left and right speakers are operating in phase. In phase means that at any given moment the cones of both speakers are moving in the same direction. If the cones of the two speakers are moving in opposite directions (out of phase), bass response and sound quality are altered. To insure proper speaker phasing, connect the positive (+) RECEIVER terminal to the positive (+) SPEAKER terminal, and the negative (—) RECEIVER terminal to the negative (—) SPEAKER terminal.

5. Connecting Speakers

a. The receiver is supplied with a pair of 10′ long prestripped speaker wires. If a second pair of stereo speakers are connected, use speaker wire of the same thickness as the speaker wire provide.

b. Connect the positive (+) terminal of your left speaker to the SYSTEM A terminal marked LEFT (+) on the receiver rear panel (See Figure 2).

c. Connect the negative (—) terminal of your left speaker to the SYSTEM A terminal marked LEFT (—) on the receiver rear panel.

d. Connect the positive (+) terminal of your right speaker to the SYSTEM A terminal marked RIGHT (+) on the receiver rear panel.

e. Connect the negative (—) terminal of your right speaker to the SYSTEM A terminal marked RIGHT (—) on the receiver rear panel.

f. Insure proper phasing. If phasing is incorrect, reverse speaker leads on one speaker.

g. To connect a second pair of speakers repeat steps b through e except all speaker wires should be connected to the SYSTEM B terminals on the receiver rear panel. Do not use speakers with an impedance of less than 8 ohms each.

h. If an auxiliary pair of speakers are used for Matrix, connect them to the terminals marked Rear in the same manner as described in steps b,c,d and e above. Rear speakers are used only in conjunction with SYSTEM A speakers.

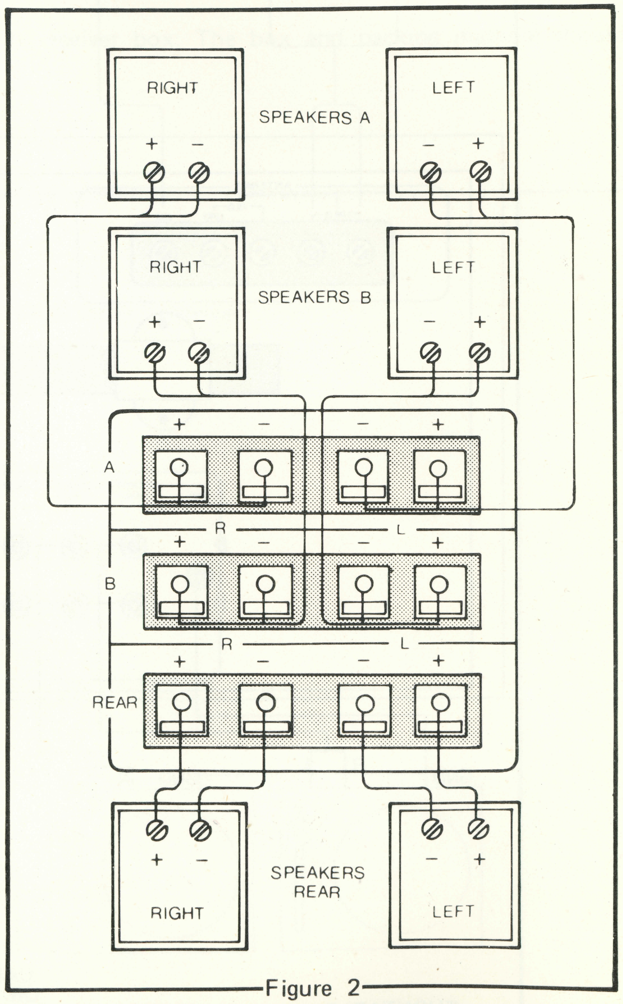


Figure 2

i. Only connect a speaker system rated for maximum safe power and/or average power handling capability suitable for this receiver. Use of speaker system not suitably rated can result in serious damage to the receiver and/or the speaker system. Such damage shall become the owner's responsibility. Connect external equipment only as recommended in this manual. Improper connections, or wrong or defective equipment connected to the receiver can result in serious damage to either and shall also become the owner's responsibility.

6. Connecting AM Antenna

Your MCS Series® receiver comes equipped with a rear panel-mounted ferrite-bar AM antenna. (See Figure 3) When oriented for strongest signal reception, this antenna will provide excellent AM reception except in deep fringe locations, where an exterior mounted AM antenna may be advisable. (See Figure 3A)

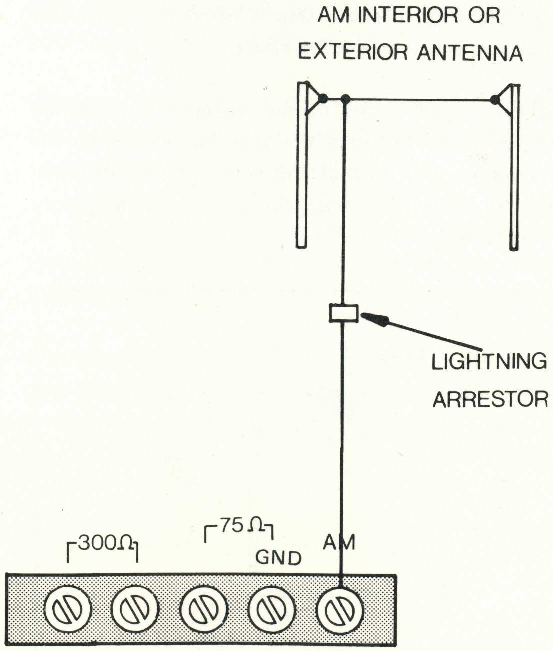


Figure 3A

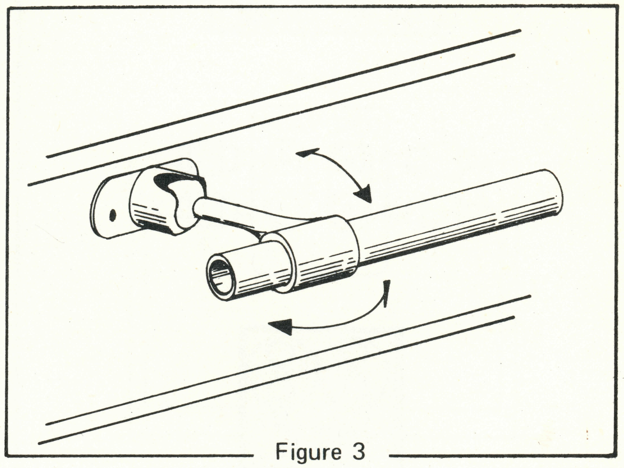


Figure 3

7. Connecting FM Antenna

a. 300 ohm antenna leadins-Model 3245 comes with a 300 ohm wire dipole whose leadins should be connected to the 300 ohm FM antenna terminals. If stronger signal reception is desired it is recommended that an outdoor directional antenna and rotor system be installed. Use 300 ohm shielded antenna leadin between your outdoor antenna and receiver. Always install a lightning arrestor on every exterior mounted antenna. Your JCPenney audio salesman will help you choose the right type of antenna system for your particular need and geographic location. (See Figures 4 and 5).

b. 75 ohm antenna leadins-For the highest quality FM reception, 75 ohm antenna terminals are provided. This allows you to install 75 ohm shielded antenna cable to your outdoor FM antenna. Use of 75 ohm cable helps reduce multipath, high voltage RF and auto ignition interference. Use it when the outdoor antenna and receiver are far apart.

c. An efficient 300 ohm dipole antenna is supplied with your unit. Connect the antenna leadins to the FM terminals and extend the arms of the antenna. Rotate the arms until positioned for best reception. (See Figure 4).

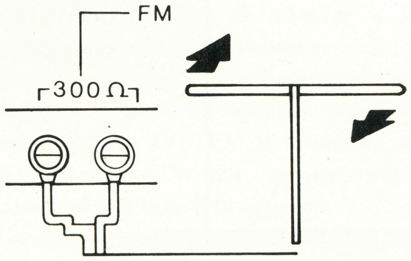


Figure 4

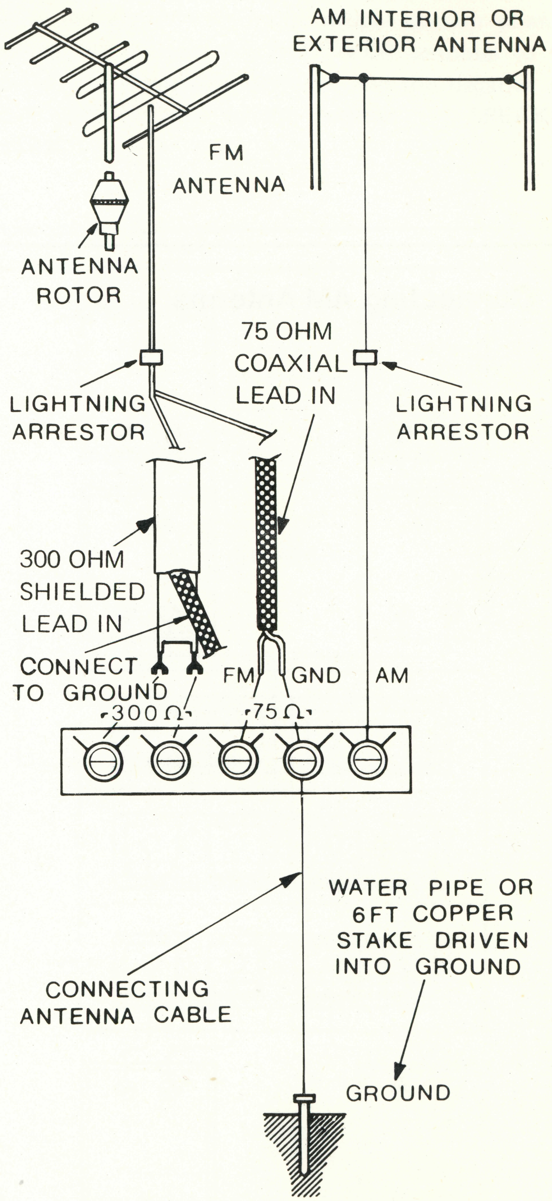

AM INTERIOR OR EXTERIOR ANTENNA
FM ANTENNA
ANTENNA ROTOR
75 OHM COAXIAL LEAD IN
LIGHTNING ARRESTOR
LIGHTNING ARRESTOR
300 OHM SHIELDED LEAD IN
CONNECT TO GROUND
FM
GND
AM
300 Ω
75 Ω
WATER PIPE OR 6FT COPPER STAKE DRIVEN INTO GROUND
CONNECTING ANTENNA CABLE
GROUND

Figure 5

8. Connecting Tape Recorders and Playback Tape Machines

Your MCS Series® receiver is equipped with two pairs of record/playback receptacles and one pair of high level AUX input receptacles. These features allow the use of two tape recorders plus a playback tape deck. Do not connect a tape recorder to the AUX input receptacle-it is a playback circuit only. Your tape recorder will not record if it is connected to the AUX input receptacles. (See Figures 6 and 7).

a. Connect the left output (play) terminal of your tape deck to the left input (play) terminal of your receiver. (See Figure 7).

b. Connect the right output (play) terminal of your tape deck to the right input (play) terminal of your receiver. (See Figure 7).

c. Connect the left input (record) terminal of your tape deck to the left output (record) terminal of your receiver. (See Figure 7).

d. Connect the right input (record) terminal of your tape deck to the right output (record) terminal of your receiver. (See Figure 7).

e. To connect a second tape recorder repeat steps a through d, using the receptacles marked TAPE 2 REC/PLAY. (See Figure 7).

f. Connect the left and right shielded cables from your playback deck to the receivers left and right AUX input receptacles (See Figure 6).

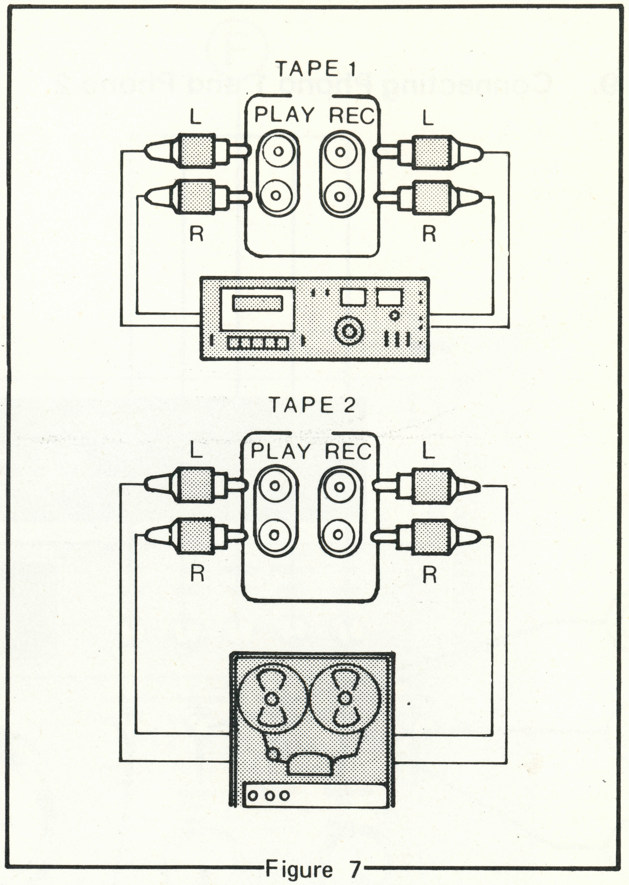


Figure 7

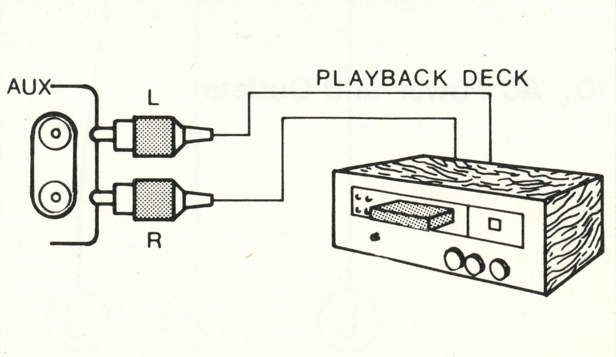


Figure 6

9. Connecting Phono 1 and Phono 2

Your MCS Series® receiver is equipped with two pairs of input receptacles for turntables. Use phono 1 to hook up a turntable with magnetic cartridge and phono 2 for turntables with ceramic cartridges. Connect the output cable of your turntable to the input receptacle of your receiver, taking care to connect the left channel output cable to the receiver's L receptacle and the right channel output cable to the receiver's R receptacle. Connect the grounding lead from turntable ground to receiver's ground terminal marked GND on rear panel. To connect a second turntable, repeat procedure, connecting L and R turntable 2 outputs to receptacles. (See Figure 8).

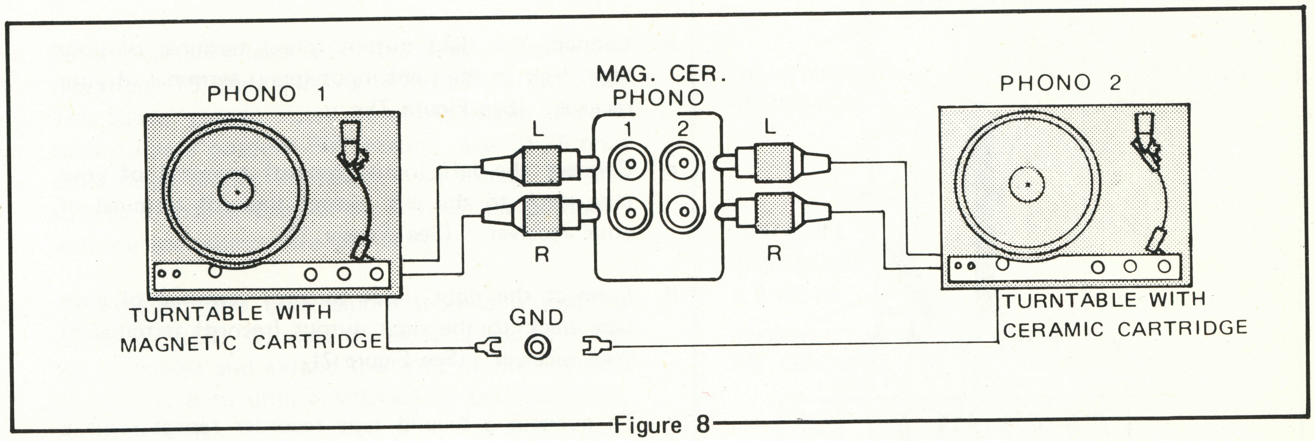
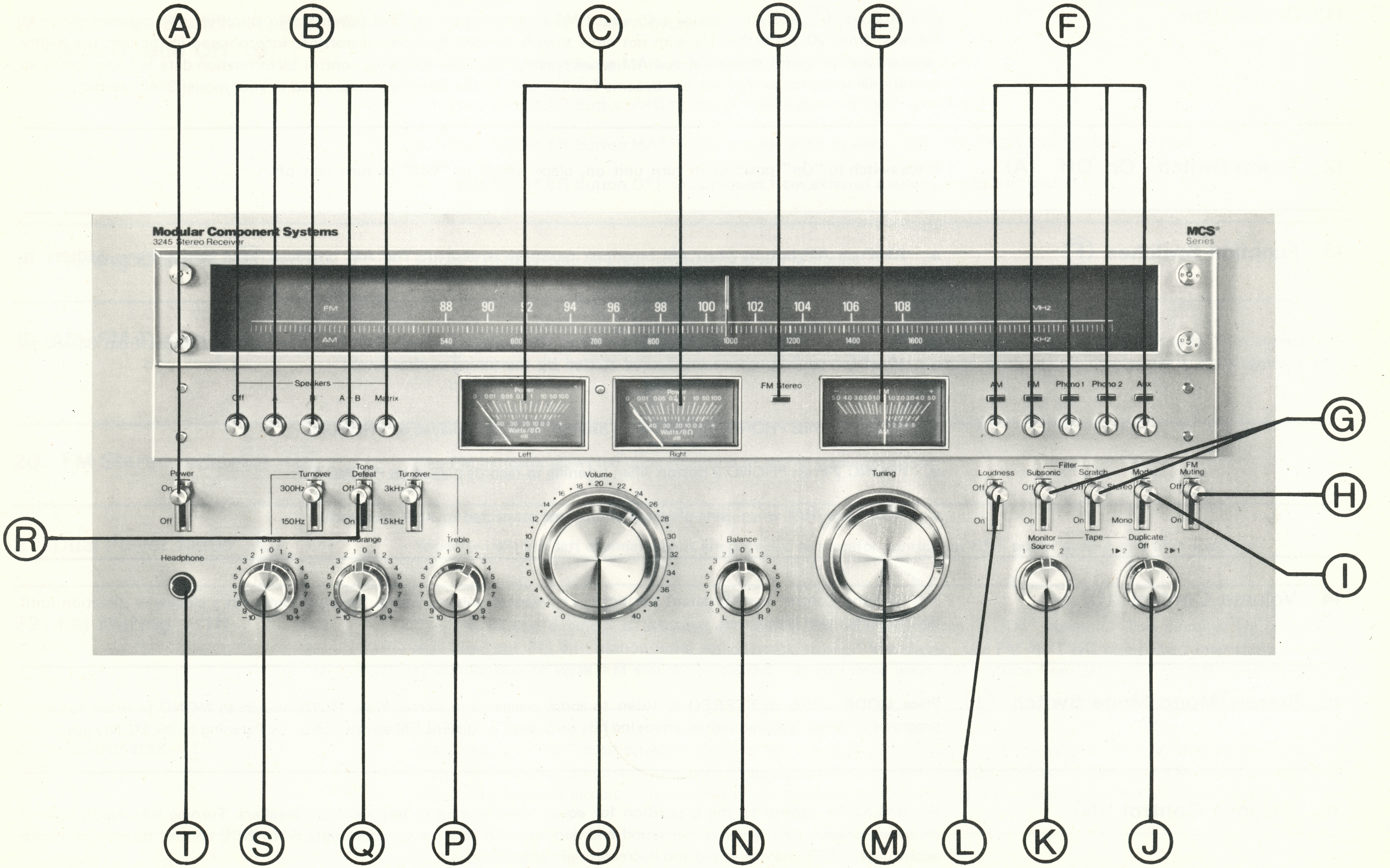


Figure 8

10. AC Power and Outlets

Your MCS Series® receiver operates from 120-volt, 60Hz wall outlet ac voltage. Two ac outlets are provided on the rear panel. The switched outlet is controlled by the front panel POWER switch. The unswitched outlet should be used when connecting a turntable to prevent accidental power loss while the turntable is in the middle of tone arm cycling.

Control Identification and Function


A
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Modular Component Systems
3245 Stereo Receiver
MCS Series
FM
AM
MHz
KHz
Speakers
Off
A
B
A+B
Matrix
Power
Watts/8Ω
Left
Right
FM Stereo
AM
FM
Phono 1
Phono 2
Aux
Power
On
Off
Turnover
300Hz
150Hz
Tone Defeat
Off
On
Turnover
3kHz
1.5kHz
Volume
Tuning
Loudness
Off
On
Filter
Subsonic
Scratch
Mode
Stereo
Mono
FM Muting
Off
On
Headphone
Bass
Midrange
Treble
Balance
L
R
Monitor Source
1
2
Tape
Duplicate
Off
1▶2
2▶1

Figure 9

Control Identification and Function

11. Description

The MCS Series® receiver contains a 45 watt RMS (minimum) per channel power stereo amplifier, two channels driven at 8 ohms, from 20 to 20,000 Hz with not more than 0.3% total harmonic distortion. Incorporated in the unit is a highly sensitive and powerful stereo FM and AM tuner/preamplifier. The following control identification data is presented in an operational sequence so that you can become familiar with all the features incorporated in your model 3245 receiver.

12. Power Switch – On/Off Ⓐ

Place switch to "On" position to turn unit on, place switch to "Off" to turn unit off.

13. Function Switches Ⓕ

a. AM-Press AM button when AM broadcast reception is desired. The AM broadcast band ranges from 550kHz to 1600kHz and is tuned to the desired station by the tuning control knob.

b. FM-Press the FM button when FM broadcast reception is desired. The FM broadcast band ranges from 88mHz to 108mHz and is tuned to the desired station by the tuning control knob.

c. PHONO 1-Press PHONO 1 button when listening to records played on PHONO 1.

d. PHONO 2-Press PHONO 2 button when listening to records played on PHONO 2.

e. AUX-Press AUX when using playback equipment connected to AUX receptacle.

14. Volume Control Ⓞ

The Volume Control has 40 detent positions. To increase volume, rotate Volume Control in a clockwise direction until desired audio level is achieved.

15. Stereo/Mono Mode Switch Ⓘ

Place MODE switch to STEREO to listen to audio programs in stereo; Place MODE switch to MONO to listen to audio programs in mono. You can reduce annoying hiss on a weak or distant FM stereo station by listening in the MONO position.

16. Balance Control Ⓝ

Set BALANCE control to the 0 position for equal power output to left and right speakers. Turning BALANCE control clockwise accentuates right channel sound and decreases left channel sound. Turning BALANCE control counter clockwise accentuates LEFT channel sound and decreases right channel sound.

Control Identification and Function

17. Speaker Switch A, B, A+B, Matrix, and Off Ⓑ	a. Press SPEAKER Button A to provide audio power to speaker system A. b. Press SPEAKER Button B to provide audio power to speaker system B. c. Press SPEAKER Button A+B to provide audio power to both speakers. d. Press SPEAKER Button MATRIX to provide audio power to both SPEAKER SYSTEMS A and Rear. e. Press SPEAKER Button OFF to cut sound from external speakers and to use headphones.
18. Tuning Control Ⓜ	Rotate TUNING control knob to desired AM or FM station.
19. AM/FM Tuning Meter Ⓔ	a. To achieve the best possible AM reception, adjust the Tuning Control Knob so that the pointer is as far right as possible. b. To achieve the best possible FM reception, adjust the Tuning Control Knob so that the pointer is at the center of the meter.
20. FM Stereo Indicator Ⓓ	The FM indicator glows red upon reception of an FM stereo broadcast.
21. Dual Power Meter Ⓒ	Separate right and left channel meters are provided to monitor continuous RMS power output to 8 ohm speakers.
22. FM Muting Ⓗ	The FM muting circuitry is activated by placing FM MUTING switch in "On" position. This circuitry will suppress and filter out FM inter-station noise while passing strong FM stations. Use FM MUTING when silent inter-station tuning or suppression of weak FM stations is desired. When tuning weak FM stations keep MUTING in "Off" position.
23. Loudness Ⓛ	Place switch to "On" position when listening to your MCS Series® receiver at low volume levels. At low volume levels the human ear exhibits non-linear frequency characteristics which tend to attenuate bass and treble while boosting mid-range sound. The loudness circuitry provides for this low volume hearing deficiency by boosting the bass and treble tones.
24. Filters Ⓖ	a. Subsonic Filter – Place switch "On" to reduce unwanted low frequency sounds such as turntable rumble. b. Scratch Filter – Place switch "On" to reduce hiss, record scratch and other undesirable high frequency noises.

Control Identification and Function

25. Bass Control and Turnover Switch Ⓢ	Both of these controls will increase or decrease the amount of tonal emphasis for low frequency sounds. Adjust the Bass Control Knob to provide the amount of tonal emphasis you prefer. Set the Turnover Switch to the 300Hz position to increase the Bass frequency response and to the 150Hz position to decrease the Bass frequency response.
26. Treble Control and Turnover Switch Ⓟ	Both of these controls will increase or decrease the amount of tonal emphasis for high frequency sounds. Adjust the Treble Control Knob to provide the amount of tonal emphasis you prefer. Set the Turnover Switch to the 1.5kHz position to increase the Treble frequency response and to the 3kHz position to decrease the Treble frequency response.
27. Midrange Control Ⓠ	Midrange is for the middle frequency sounds. Adjust the Midrange Control Knob to provide the amount of tonal emphasis you prefer.
28. Tone Defeat Ⓡ	Setting the switch to "On" will automatically restore the tone shaping circuitry to flat response, thereby giving all tones the same emphasis. Use this feature to compare your equalized tone setting to flat tone responses.
29. Tape Duplicate Ⓙ	The TAPE DUPLICATE switch permits duplication of a tape recording between two connected tape recorders. Set TAPE DUPLICATE 1 – 2 when you wish to record a tape 1 program onto tape recorder 2. Set TAPE DUPLICATE 2 – 1 when you wish to record a tape 2 program onto tape recorder 1. At ALL OTHER TIMES this switch should be in the "Off" position.
30. Tape Monitor Switch Ⓚ	a. RECORDING – If your tape recorder has facilities for tape monitoring you may compare the sound of the original program material to that which you are recording. To monitor the tape, alternate the Tape Selector Switch between "Source" to hear the original program material and Tape 1 or Tape 2 to hear the same material through your tape recorder. For tape units that do not have tape monitoring facilities the Tape Selector Switch should be in "Source" position. This position will allow the original program material to be heard. b. TAPE PLAYBACK – Set the Tape Monitor to either Tape 1 or Tape 2 position and place the Mode button to either stereo or mono as required by the source. The position of the Function Selector buttons are of no consequence because only material on tape will be heard. Remember to always set the Tape Monitor Switch to "Source" position after you have finished playing or recording tapes; otherwise no program source (AM/FM/Phono1/Phono2/Aux) will be heard until you do.
31. Headphones Ⓣ	Connect any 8 ohm impedance stereo headphones to the HEADPHONES jack on the front panel of your receiver. The SPEAKERS OFF pushbutton must be pushed in for headphone operation.

32. MCS Series® Receiver

This receiver incorporates the very latest concepts in solid state physics and integrated circuit design. Modular Component System construction also allows stereo receiver flexibility and future audio system expansion. Every MCS Series® receiver owner will be able to take full advantage of all the MCS Series® technical design features incorporated in this unit. After many years of use you can be assured that your MCS Series® receiver will not be technically obsolete. The diagram on the inside back cover provides an internal circuitry chart that relates to the following descriptions.

33. Tuner Circuitry

FM/AM-A gear drive 6-gang (4-gang for FM, 2-gang for AM) variable tuning capacitor is employed to offer accurate tuning over long periods of operation. A dual gate MOS-FET (field effect transistor) in the FM front end provides improved image rejection and spurious rejection and can accept very strong FM signals without overloading. The use of ceramic IF filters (3 for FM, 1 for AM) provide improved alignment stability and selectivity in the IF strips. The Phase-Lock-Loop (PPL) circuitry in the FM multiplex demodulator ensures extra stable alignment and improved stereo separation. The use of Integrated Circuit chips, coupled with features like the Combination Signal/Strength/Tuning Meter ensures high quality FM and AM broadcast reception.

34. Phono Preamplifier

Magnetic/Ceramic-Two separate phono preamplifier sections are used to amplify the magnetic phono and the ceramic phono cartridge's output voltage to a voltage level compatible with the control unit. RIAA magnetic cartridge equalization is accurate to within ±1.0dB over the entire phono frequency range as specified by the RIAA. This ensures that all the recorded information is reproduced exactly as intended by the recording engineers.

35. Control Section

The control unit facilitates the collection and distribution of the various audio programs available. It also provides for variable amplitude, tone and timbre control of the selected audio signals. When the receiver is operating from a tape deck, the tape monitor switch permits the selected tape recorder to be connected to the attenuator control circuitry and, after amplification, to the speaker system. The tape dubbing circuits provide a means for inter-tape recorder transfer of audio signal; e.g. from TAPE 1 to TAPE 2.

35. Control Section (Continued)

a. Function selection circuits—The function selection circuits work in conjunction with the FUNCTION push buttons (with LED display) either AM, FM, PHONO 1, PHONO 2 or AUX program sources for future application to the speaker systems. Regardless of the program source (tape, tuner or record) the stereo/mono MODE select circuit will permit either stereophonic or monophonic audio outputs to be present. It should be noted that a stereo program source will be presented in a monophonic format if the MODE switch is left in the MONO position.

b. Loudness circuitry-Loudness compensation in the bass and treble tone ranges can be added to low volume audio. Placing the LOUDNESS switch in the ON position will enable the loudness circuitry to compensate for the human hearing deficiency to bass and treble sound perceived at low volume listening.

c. Balance – The final stage of audio signal processing contained within the control unit of the receiver is left and right audio signal balance. The left and right balanced audio signal is then connected to the master attenuator control circuitry.

36. Volume Control

A master volume control potentiometer is used for both left and right volume. By incorporating a precision ganged volume control with 40 detent positions, volume is adjusted simultaneously on left and right for accurate tracking. The left and right attenuated audio signal is then routed to appropriate left and right tone defeat circuits.

37. Tone Defeat

When activated, the left and right tone defeat circuits bypass the control pre-amp and feed a flat audio signal to the high/low noise filter circuitry. With the TONE DEFEAT disengaged, the audio signal is sent directly from the attenuator circuits to the appropriate left and right control pre-amp circuitry.

38. Turnover

a. Bass-Increases the bass frequency response +3dB when switched from 150Hz to 300Hz by altering the low frequency time-constant turnover.

b. Treble-Increases the high frequency response +3dB when switched from 3kHz to 1.5kHz by altering the high frequency time-constant turnover.

39. Bass, Treble And Midrange

These controls provide versatility in tone shaping. Adjust each to the desired level.

40. Scratch and Subsonic Noise Filters

a. Subsonic Filter-Reduces unwanted low frequency sounds such as turntable rumble by altering the low frequency roll-off.

b. Scratch Filter-Reduces hiss, record scratch and other undesirable high frequency noises by altering the high frequency roll off.

41. Power Amplification

The left and right audio signals (possibly filtered and equalized) are coupled to the input of the 45 watts RMS per channel solid state power amplifier. The output transistors are arranged in a complementary symmetry design to provide high gain with non-perceivable distortion. Large surface area heat sinks enable effective heat dissipation from the power output transistors for high power audio applications. Left and right audio signal outputs from the power transistors go directly to the speaker protector circuitry.

42. Speakers Protection

These devices are located on the rear panel adjacent to the speaker connection terminals (please refer to Figure 1, Page 2). The operation and function is very similar to a circuit breaker. If an overload or fault condition should occur, the Speakers Protection will open. This disconnects the power output stage from the speakers and output meters. To re-set, wait approximately 20 seconds, then push in the Speakers Protection button for approximately 3 seconds, and then release. Repeated opening of this device may indicate improper installation or a fault in your receiver. If this should happen, take your receiver to the nearest J. C. Penney store for servicing.

43. Cabinet and Receiver Cleaning

The cabinet and receiver should NEVER be cleaned with abrasives or strong chemical solutions. Use a soft, damp cloth to remove any dirt. Always apply polish or glass cleaner onto a soft cloth, never directly onto the receiver.

44. Over Current Protector

This device is located on the rear panel adjacent to the AC power supply cord (Please refer to Figure 1, Page 2). The operation and function is very similar to a circuit breaker. If an internal overload or fault condition should occur, the Over Current Protector will open. This disconnects the AC power from the receiver. To re-set, wait approximately 20 seconds, then push in the Over Current protector button for approximately 3 seconds and then release.

Repeated opening of this device indicates improper installation or a fault in your receiver. If this should happen, take your receiver to the nearest J.C. Penney store for servicing.

Troubleshooting Hints

45. Introduction

From time to time conditions may arise which indicate that your receiver may be malfunctioning. Before returning the unit for service it is recommended that you check the troubleshooting hints provided in the following table. If, however, your MCS Series® receiver does need service, you will find JCPenney Product Service ready and willing to help you. Just return your MCS Series® receiver (with all packing material, if possible) to your nearest JCPenney store or catalog desk for prompt and courteous service.

SYMPTOM	PROBABLE CAUSE	REMEDY
Power is not supplied	Power cable is not plugged into wall outlet.	Re-insert power plug firmly.
	Power circuit breaker cut-out.	Reset by pushing the breaker button in.
No sound	SPEAKERS switch is set to off.	Reset SPEAKERS switch to A, B, A+B or MATRIX. Press button indicating the terminals your speakers are connected to.
	Speaker circuit breaker cut-out.	Reset by pushing the breaker button in.
	Tape Monitor Switch is set to 1 or 2.	Set tape Monitor Switch to Source.
Sound level is different between L&R	BALANCE control is off center.	Re-adjust BALANCE control.
Recorded tape cannot be reproduced	TAPE MONITOR switch is set to wrong position	If tape deck is connected to TAPE 1 terminals, set TAPE MONITOR switch to 1; set it to 2 if tape deck is connected to TAPE 2 terminals.
	Recorded tape is faulty (not recorded properly).	Replace tape.
	Tape deck is not properly operated for playback	Follow owner's manual for tape deck and operate tape deck correctly.
Cannot hear a record being played	TAPE MONITOR switch is set to 1 or 2.	Set FUNCTION switch to PHONO 1 or PHONO 2. Depending upon which turntable is being used.
	Turntable is not connected properly.	Connect turntable properly.
Cannot hear an FM or AM broadcast	TAPE MONITOR switch is set to 1 or 2.	Set TAPE MONITOR switch to SOURCE.
	FUNCTION switch is set to wrong position.	Set FUNCTION switch to AM or FM.
Sound image is blurred with lack of bass	Plus/minus polarities of speaker systems are connected wrong.	Re-connect speaker cords to match polarities correctly.
Noise while playing a record	Dust/dirt on the record.	Clean record surface.
	Dust/dirt on the stylus.	Clean stylus tip.
	Stylus is worn out.	Replace stylus.
Noise while receiving an AM or FM broadcast	Antenna is not properly oriented.	Change direction of antenna for maximum indication on the AM/FM tuning meter.
	Improper tuning.	Tune in desired station correctly while watching Tuning Meter Display.
	Unit is located too close to TV set.	Move unit away from TV set.
Phono hum	Improper phono ground connection.	Connect phono ground wire to amplifier's GND terminal.
System hum	Ground loop formed.	Reverse ac outlet plug.

Technical Specifications

46. Introduction

The following is a list of technical specifications for model 3245 receiver.

PARAMETER	DESCRIPTION	
	NOMINAL	LIMIT
AF Section		
Output Power (8 OHM Load)[1]	48 + 48 Watt	45 + 45 Watt
Signal to Noise Ratio:		
Phono (Magnetic) Input	70dB	65dB
AUX (IHF A-Network, short circuit)	80dB	75dB
Input Sensitivity		
Phono (Magnetic) Input	2.5mV	2.5mV ± 2dB
AUX, Tape 1, Tape 2 Input	80mV	150mV ± 2dB
Frequency Response (–3dB) AUX	10–70,000Hz	15-50,000Hz
Frequency Response[2]	± .5dB	± 1.0dB
Tone Control		
Bass 50Hz (300Hz) cut/boost	± 10 dB	± 9 dB
Bass 50Hz (150Hz) cut/boost	± 8 dB	±7 dB
Mid-Range 1kHz cut/boost	± 8 dB	±6 dB
Treble 10kHz (3kHz) cut/boost	± 8 dB	±7 dB
Treble 10kHz (1.5kHz) cut/boost	± 10 dB	±9 dB
Filters		
High cut (15kHz)	–12 dB	– 12dB ± 2 dB
Low cut (10Hz)	–12 dB	– 12dB ± 2 dB
Loudness at –40 dB Volume:		
100Hz	+10	10 ± 2
10kHz	+6	6 ± 2

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[1] Both channels driven at 20Hz–20kHz 0.3%. THD.

[2] Phono (Magnetic) Input Deviation from standard RIAA Curve 30Hz–20kHz.

Technical Specifications

PARAMETER	DESCRIPTION	
	NOMINAL	LIMIT
FM Section		
Quieting Sensitivity – 30dB IHFM at 90,98 106mHz	8.7dBf/1.5μV	11.2dBf/2μV
Signal-to-Noise Ratio 1mV Input at 98mHz	60dB	55dB
Image Rejection at 106mHz	75dB	65dB
Selectivity (± 400kHz) at 98mHz, 100μV Input	70dB	65dB
Capture Ratio at 98mHz, 1mV Input	1.0dB	2.0dB
Frequency Response (–3dB) at 98mHz, 1mV Input	35–15,000Hz	50-14,000Hz
Stereo Separation at 98mHz, 1mV		
Input: 100 Hz	35dB	30dB
1 kHz	40dB	35dB
10 kHz	30dB	25dB
Stereo Sensitivity	17.2dBf/4.0μV	25.2dBf/10 μV
Distortion Mono at 98mHz, 1mV Input	.2%	.4%
Distortion Stereo at 98mHz, 1mV Input	.4%	.6%
AM Section		
Usable Sensitivity–20dB, S/N	350μV/m	500μV/m
Signal-to-Noise Ratio	43dB	38dB
Selectivity	34dB	28dB
Image Rejection	44dB	38dB
Frequency Response-6dB	40-2800Hz	50-2700Hz
Dimensions	18⅞"W x 7½"H x 14⁹⁄₁₆"D	
Weight	26.4 Lbs.	

47. Room Acoustics and Speaker Placement

a. Room acoustics

Sound waves can be divided into two groups: direct and reflected sound. Direct sound emanates from the loudspeaker following an uninterrupted route to the listener's ear. Reflected sound is an image of the original sound source traveling an indirect route to the listener. Reflected sound is very important for stereo imaging and reinforces concert hall realism. Proper tone balance between direct and reflected sound is the function of room accoustics.

Drapes, carpeting, upholstery and even people absorb sound energy, thereby reducing reflected sound. Bare floors, walls, and hard surfaces add to reflected sound. A room with high absorption qualities will sound dead or lacking brilliance. A room with high reflective qualities will sound too bright or may even echo. To achieve a balanced environment, set speakers against a reflective wall, facing a less reflective wall on the other side of the room. As a general rule, do not place speakers against a wall having the same absorption or reflective qualities as the wall opposite it. (See Figure 10).

b. Speaker placement

Speaker placement is critical to stereo sound. A little time spent in planning speaker location in advance will ensure excellent stereo imaging and high quality audio reproduction.

Speaker position A (as shown in Figure 10) indicates a room with a speaker located in each corner. This position will give the greatest bass enhancement. If the distance between speakers will be greater than 10 feet, it may become necessary to aim speakers toward the center of the room (or listening position) to preserve stereo imaging. If audio output contains too much bass, move speakers 3 to 6 inches from rear wall or try speaker position B.

Position B is arranged with left and right speakers placed away from each room corner by a distance equal to 20 percent of rear wall length. Notice, in speaker position B the left and right speakers are not flush against the wall. This distance from rear wall (3 to 6 inches) will attenuate bass. If the audio output lacks bass, move the speakers back so they are flush against the rear wall.

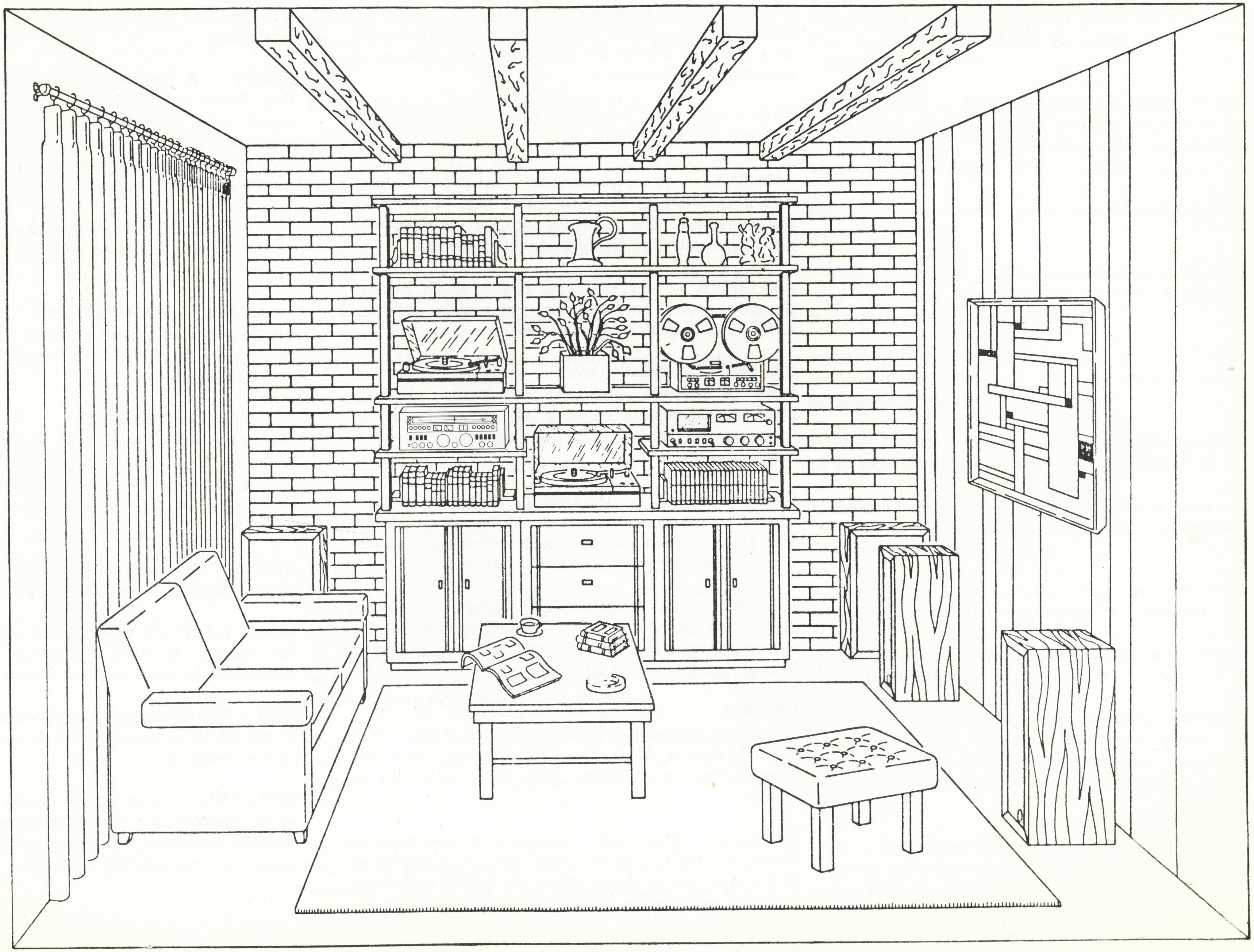


Figure 10.

48. Glossary

ACOUSTICS — Generally, the study of how sound waves behave. More specifically the characteristics of a room or auditorium that affect the behavior of sounds produced within it.

AFC — Automatic Frequency Control. Prevents drift on FM and FM stereo tuners.

AMBIENCE — A replacement term for ambient sound. Ambience refers to the total sound field in which we are immersed. The ambience includes the direct and reflected sound from one or more sound sources.

AMPLIFIER — An electronic device which receives an audio input, provides gain, and supplies resultant audio output signals to drive its speaker system.

BALANCE — Relative volume, as between bass and treble or different voices and instruments. Also applied to relationships between left and right channels in stereo and left and right front and rear channels in quadraphonics.

BASS CONTROL — Increases or decreases loudness of the low tones. An increase of frequencies below 500 Hz is known as bass boost. Reduction of low tone loudness is known as bass cut or attenuation.

CHANNEL — A complete and independent sound path. For example, the left channel contains all the circuitry and transducers which culminate in sound emanating from the left side.

DECIBEL — The decibel, abbreviated dB, is a logarithmic measure of relative signal strengths. A 6 dB difference in signal strengths is equivalent to a four times difference in power (two times difference in voltage).

DECK — A term usually applied to a tape machine having no built-in power amplifiers or loudspeakers of its own, but intended rather for feeding a separate amplifier and speaker system (as in a component installation).

DISTORTION — Unwanted alteration of signal to be reproduced.

DOLBY — A noise-reduction system invented by Dr. Ray Dolby, which boosts low-level, high frequency signals upon recording and reduces their level in a complementary manner upon reproduction. Some FM stations now broadcast Dolbyized signals, but special equipment is needed to decode it.

FET — Field Effect Transistor. A special transistor used in high quality tuners to pick up and distinguish weak signals.

FREQUENCY MODULATION — The method whereby the frequency of a carrier is made to vary in proportion to the signal strength of the Program. It is used in FM radio transmission.

FREQUENCY RESPONSE — The range of audio frequencies from low to high that may be reproduced or processed by any audio device; the limits are expressed in hertz or kilohertz along with a specification of flatness (in dB) for the range. (e.g., 20–20,000 Hz ± 3 dB)

HERTZ — A frequency measurement abbreviated Hz. Audio frequency range is 0 to 20 kHz.

HIGH FILTER — Circuitry often used to cut off amplifier response to audio frequencies above 15kHz. It minimizes FM stereo hiss and scratch sounds on records.

HUM — The undesirable reproduction of signals related to the 60 Hz ac power line; hum is perceived as a low-pitched steady tone.

IMPEDANCE — That rating, usually of a loudspeaker, which specifies the load it imposes on an amplifier. Nominal impedance is the average rating over a band of frequencies, typically the midrange.

48. Glossary (Continued)

INTEGRATED CIRCUIT – A miniaturization of a complex electronic circuit to a thumbnail-sized device resulting in identical performance to the original large circuit. Also called a CHIP.

JACK – The receptacle that accepts a plug.

KHz – Abbreviation for kilohertz, which is one thousand hertz. Thus 3 kHz means 3000 Hz; a unit of frequency.

LOUDNESS – A switch which enables circuitry in an amplifier to compensate for the deficiency in bass response of the human ear at low volume levels. Bass response is boosted slightly when loudness is on. Do not confuse this with Volume or Bass.

LOUDSPEAKER – A device which converts electrical power into sound energy.

LOW FILTER – Circuitry used to cut off amplifier-to-audio frequencies below 30 Hz; reduces low frequency hum and rumble of turntable and tape deck.

MIDRANGE – Those frequencies which lie within the range of 400 to 3500 Hz.

MONOPHONIC – A single channel sound system; also called mono. A monophonic system can have the same frequency response, power, etc. of any other system, but it cannot produce width or depth to the sound image. Essentially, the sound is perceived as coming from a single point, the loudspeaker.

NOISE – Any sounds which are not harmonically related to the signal and are added subsequently by the recording or playback equipment. Noise includes hiss, crackles, hum, rumblings, ticks and pops, etc.

NOISE REDUCTION CIRCUIT – Any circuitry which has for its purpose the reduction of noise in the sound channel. One of the most widespread approaches is the Dolby.

OCTAVE – The musical interval between two pitches whose fundamental frequencies differ by a ratio of 2 to 1. Thus, 440 and 880 Hz constitute an octave's interval.

PERSPECTIVE – In a recording, the quality of depth or apparent relative distance between the listener and the sound sources. The impression that one source is located behind another.

PHASE – The cyclical angle between two signals of equal frequency.

PHONE PLUG – A telephone switchboard plug or any plug resembling this; generally used on headphones and high-impedance microphone.

PHONO PLUG – A small coaxial plug used as the industry standard (in the U.S.) for interconnections between high fidelity components.

POWER CORD – Cord for connecting audio equipment to an external power source, such as a 120-volt ac line.

PREAMPLIFIER – Preliminary amplifying stage used to raise the voltage of signals prior to application to an amplifier section.

RECEIVER – The combination of a tuner, preamplifier, and power amplifier in a single piece of equipment.

RESONANCE – The frequency which will cause an object to vibrate.

REVERBERATION – A slight, tapering prolongation of sounds due to multiple reflections in a large auditorium. As distinguished from echo, which is (acoustically) a sudden return of sound rather than a smooth delay.

RMS – Root Mean Square. An engineering term which describes the effective value of a pure sine wave voltage, rather than the peak value of the same sine wave. In audio, often applied to power output of amplifiers to indicate the continuous power output in watts.

48. Glossary (Continued)

RUMBLE – Low frequency sound (30 Hz to 50 Hz) mechanically transmitted by a turntable and superimposed on the audio.

SENSITIVITY – The measure of a tuner's ability to receive and amplify a weak signal without introducing excessive noise; expressed in microvolts (millionths of a volt).

SEPARATION – The quality of separateness between the individual channels of multichannel sound system. It is related to cross-talk between the channels. Separation frequently refers to the apparent isolation between the sound images.

SIGNAL-TO-NOISE RATIO – Abbreviated S/N ratio. This is the span measured in decibels of signal intensity between a device's overload point at the upper limit and its background noise at the lower limit.

STEREO – Two-channel. Sound coming from two or more speakers with each speaker or set of speakers emitting a different part of the overall sound. Adds a dimensional effect to the sound.

STEREOPHONIC RECORDING – Sound recording with depth. A stereo recording is made with two or more microphones and channels which convey information about the original lateral directions of the original instruments.

TAPE MONITOR – A switch in an amplifier or tuner which allows the owner of a three-head tape recorder to hear (monitor) the quality of a recording while it is being taped.

THD – Total Harmonic Distortion level. Expressed as a percentage.

TRANSISTOR – A solid state device made with either germanium or silicon which can serve the same functions as vacuum tubes. Has the advantages of compactness, instant-on, long life, reduced heat, and lower power consumption.

TREBLE CONTROL – Increases or decreases loudness of the high tones. An increase of frequencies above 2000 Hz is known as treble boost. Reduction of high tone loudness is known as treble cut or attenuation.

TWEETER – A loudspeaker designed to create high frequency sounds. Generally a small cone speaker or horn speaker.

VU METER – Strictly, a recording level meter that measures signal strength according to a specified standard. Used to measure recording levels, output levels and receiving levels.

WATT – Unit of electrical power.

WAVELENGTH – The distance between the beginning and the end of a complete cycle of any spatial periodic phenomenon. In acoustics it is the distance occupied by one cycle of a repetitive sound traveling through the air at a velocity of about 1,100 feet per second. A 1,100 Hz tone has a wavelength of one foot.

WOOFER – A loudspeaker designed to reproduce low frequencies; generally a large cone speaker.

WOW – A low frequency sound (flutter) caused by an improperly balanced turntable or warped record.

49. Record Care

A primary factor in the performance of any stereo system is the quality of each component comprising the system. An audiophile can purchase equipment capable of faithful reproduction of the entire audio frequency spectrum; however, if the primary source of sound is lacking or distorted, then the stereo equipment will reproduce a distorted sound. A major cause of distortion in a stereo system can be traced to improperly handled or cared-for records. The following are a few things to remember in record care:

a. Always handle records by the outer edges; never touch the playing surface (grooves).

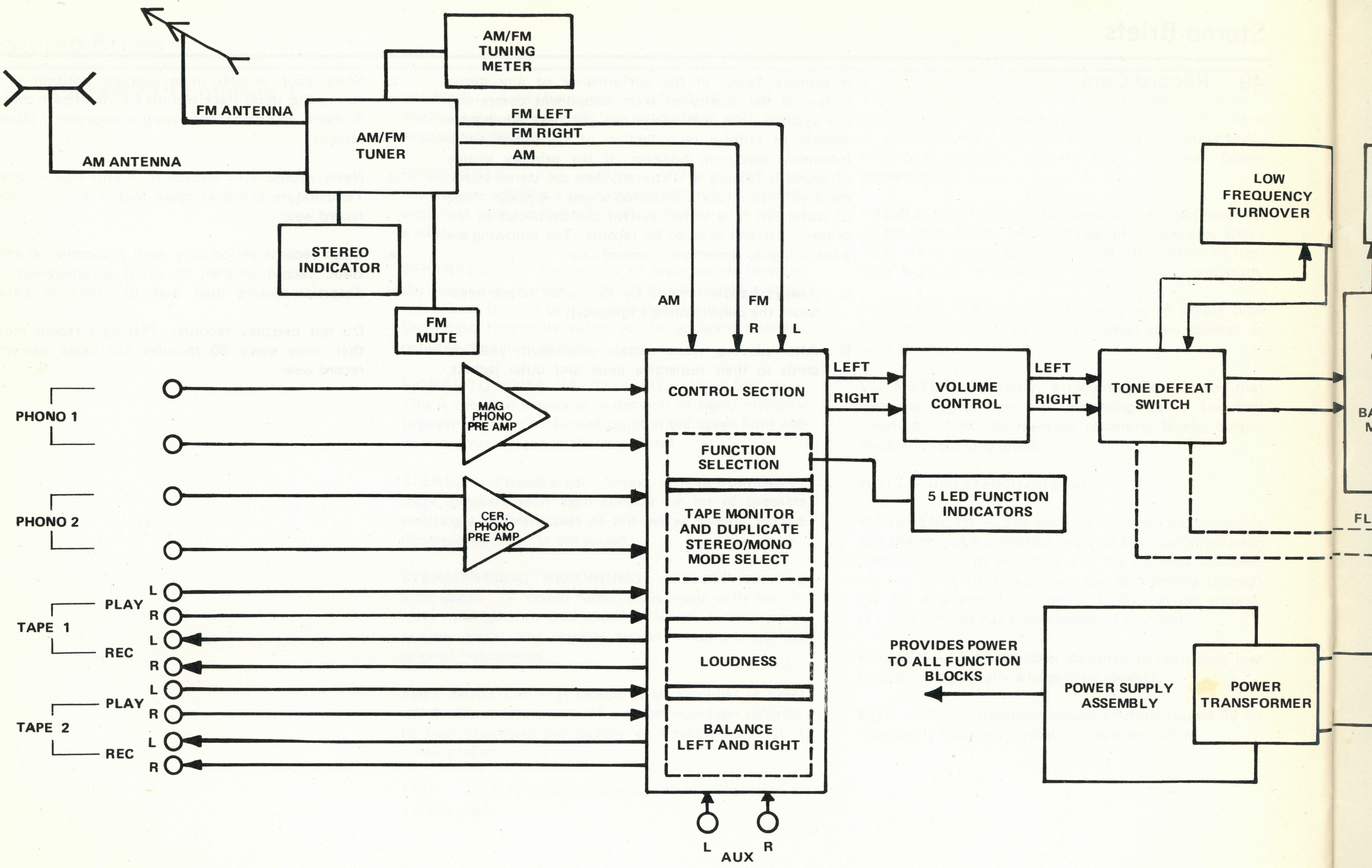
b. After playing, make certain you return your records to their respective inner and outer jackets.

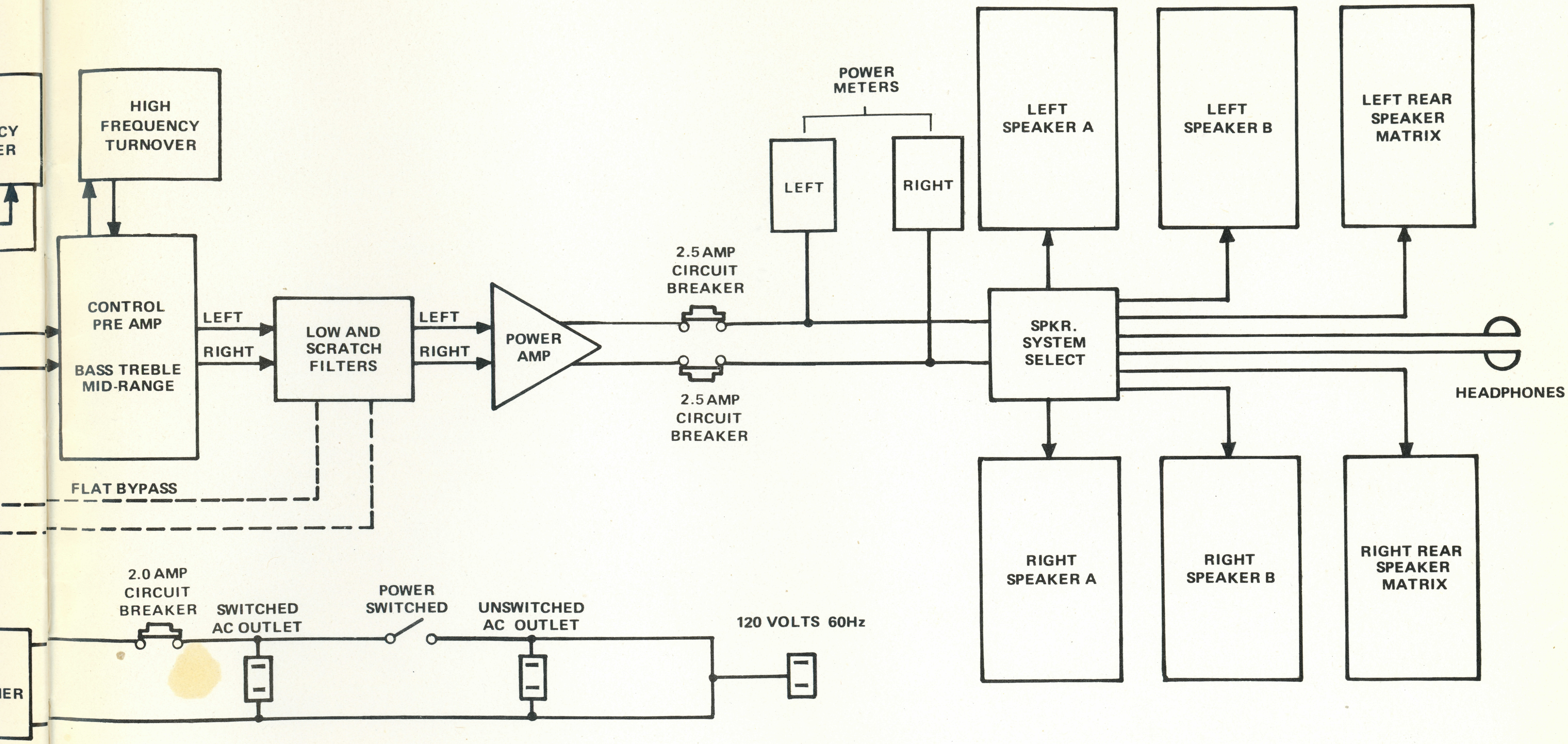
c. Store your records in an upright position in a record file; never stack records on top of each other. A major cause of record warp is improperly stored records.

d. Never expose your records to intense heat or cold. Temperature extremes cause source distortion and record wear.

e. Clean records periodically with a commercial anti-static record cleaner to avoid accumulation of distortion-causing dust and to minimize static.

f. Do not overplay records. Playing a record more than once every 30 minutes can cause extreme record wear.


AM/FM
TUNING
METER
FM ANTENNA
AM ANTENNA
AM/FM
TUNER
FM LEFT
FM RIGHT
AM
STEREO
INDICATOR
FM
MUTE
AM
FM
R
L
PHONO 1
MAG
PHONO
PRE AMP
PHONO 2
CER.
PHONO
PRE AMP
TAPE 1
PLAY
REC
TAPE 2
PLAY
REC
L
R
L
R
L
R
L
R
CONTROL SECTION
FUNCTION
SELECTION
TAPE MONITOR
AND DUPLICATE
STEREO/MONO
MODE SELECT
LOUDNESS
BALANCE
LEFT AND RIGHT
L
R
AUX
LEFT
RIGHT
VOLUME
CONTROL
LEFT
RIGHT
TONE DEFEAT
SWITCH
LOW
FREQUENCY
TURNOVER
5 LED FUNCTION
INDICATORS
PROVIDES POWER
TO ALL FUNCTION
BLOCKS
POWER SUPPLY
ASSEMBLY
POWER
TRANSFORMER


HIGH FREQUENCY TURNOVER
CONTROL PRE AMP
BASS TREBLE MID-RANGE
LEFT
RIGHT
LOW AND SCRATCH FILTERS
LEFT
RIGHT
POWER AMP
2.5 AMP CIRCUIT BREAKER
2.5 AMP CIRCUIT BREAKER
POWER METERS
LEFT
RIGHT
LEFT SPEAKER A
LEFT SPEAKER B
LEFT REAR SPEAKER MATRIX
SPKR. SYSTEM SELECT
HEADPHONES
RIGHT SPEAKER A
RIGHT SPEAKER B
RIGHT REAR SPEAKER MATRIX
FLAT BYPASS
2.0 AMP CIRCUIT BREAKER
SWITCHED AC OUTLET
POWER SWITCHED
UNSWITCHED AC OUTLET
120 VOLTS 60Hz

FUNCTIONAL BLOCK DIAGRAM
MODEL 3245

Figure 11.

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Model No. 3245
Catalog No. 853–2418

Printed in Taiwan

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